

## AMPHIPODA FROM COSTA RICA.

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The specimens here described were sent to me for determination by the United States National Museum, and represent two new species. They were collected by Prof. P. Biolley, of the National Museum of Costa Rica.

### Family TALITRIDÆ.

1900. *Talitridæ* STEBBING, Fauna hawaiiensis, II, p. 527.

**TALORCHESTIA FRITZI**, new species.

Plate LX.

The largest of the male specimens have the peræon transversely corrugated, each of the segments showing two folds, except the first segment, which has a single fold. All the specimens, however, 15 in number, have the integument brittle and most of the muscular parts shrunken. The exceptional corrugation, therefore, in the large male examples may not be a natural feature, but merely due to conditions experienced since their capture. In the synoptic table published four years ago<sup>a</sup> for discriminating the genera of the Talitridæ, at that time called Orchestiidae, the leading distinction between *Orchestia* and *Talorchestia* rests on the fact that in the former the first gnathopods of the female are subchelate, whereas in the latter they are simple. So far as this distinction is concerned, the present species clearly belongs to *Talorchestia*. The sixth joint of the limb in question has no distal widening to furnish a "palm" upon which the finger can close. In *Orchestia* the widening is seldom or never very great, but how far it may be reduced without effecting generic change has not yet been determined.

The eyes may be described as rotundo-quadrata, with a diameter much larger than the interval between them.

First antennæ of male have the middle joint of the peduncle slightly the longest, the five-jointed flagellum about half as long as the peduncle, the whole appendage being subequal in length to the last joint in the peduncle of the second pair. In the female the flagellum has three

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<sup>a</sup>Trans. Linn. Soc. London, Zool., 2d ser., VII, Pt. 3, 1899, p. 397.

joints, and the whole appendage is nearly as long as the last two joints of the peduncle in the following pair.

In the adult male the second antennæ have the peduncle massive, its last joint a little longer than the penultimate, the flagellum consisting of 14-17 joints, many of which widen distally, with minute spines thrust into prominence. In the female, already carrying marsupial plates, the antennæ, as shown in the figure, are of insignificant size compared with those of the male. The ten-jointed flagellum equals in length the last two joints of the peduncle.

The mouth organs exhibit no distinctive peculiarity. The palp of the first maxillæ is minute. No trace of a fourth joint could be perceived on the palp of the maxillipeds.

The first gnathopods of the male have the long wrist or fifth joint distally widened, and on the inner side of the spinulose prominence is a pellucid bubble-like tubercle. The sixth joint is shorter, but similarly widened, its prominence beset with spinules and capped with a pellucid portion like the bubble on the preceding joint. The small, conical finger closes over a shallowly excavate palm, its point reaching but by no means overlapping the clear prominence. In the female the wrist is distally widened, but without special prominence or tubercle, while the sixth joint is for some distance parallel-sided, and then, instead of widening, tapers slightly to the insertion of the finger. Like the preceding joint, it has spines on both margins, those on the hinder or inner margin being the more important.

The second gnathopods of the full-grown male have large oval hands, with the palm very oblique, beset on both sides with spines, and in the middle slightly flattened, so as to leave a shallow interval when the massive, strongly curved finger closes, bringing its apex into the pocket at the end of the palm. Near the hinge of hand and finger the palm has a short but rather deep excavation, into which a corresponding prominence of the finger's inner margin neatly fits. This notable feature occurs elsewhere in the Talitridæ, as in *Orchestoidea tuberculata* Nicolet, *Orchestia tucurauna* Fritz Müller, and *Orchestia sulenson* Stebbing. These stand, it is true, in different genera, but the generic position of the third is obscure, because the female is not yet known. It is, however, clearly distinguished from the species now under discussion by the different character of its first gnathopods. With Fritz Müller's species there are other difficulties, as will appear by the following quotation from his celebrated treatise.<sup>a</sup> Müller is calling attention to the fact that the development of the sexual peculiarities does not stand still on the attainment of sexual maturity, and proceeds to give instances:

For example, the younger sexually mature males of *Orchestia Tucurauna*, n. sp., have slender inferior antennæ, with the joints of the flagellum not fused together,

<sup>a</sup> Für Darwin, 1864, p. 54; Accurately translated by Dallas under the title, Facts and arguments for Darwin, 1869, pp. 79, 80.

the clasping margin ("palm," Sp. Bate) of the hand in the second pair of feet is uniformly convex, the last pair of feet is slender and similar to the preceding. Subsequently the antennæ become thickened, two, three, or four of the first joints of the flagellum are fused together, the palm of the hand acquires a deep emargination near its inferior angle, and the intermediate joints of the last pair of feet become swelled into a considerable incrassation. No museum-zoologist would hesitate about fabricating two distinct species, if the oldest and youngest sexually mature males were sent to him without the existing intermediate forms. In the younger males of *Orchestia Tucuratinga*, although the microscopic examination of their testes showed that they were already sexually mature, the emargination of the clasping margin of the hand (represented in fig. 50) and the corresponding process of the finger, are still entirely wanting. The same may be observed in *Cerapus* and *Caprella*, and probably in all cases where hereditary sexual differences occur.

A footnote says that fig. 50 represents the second gnathopod of the male, and fig. 51 that of the female, of *Orchestia tucuratinga*.

The original German edition adds the letters "n. sp." after the mention of *O. tucuratinga*. For the translation Müller himself supplied corrections of printer's errors in the original. Yet we find *O. tucuratinga* and *O. tucuratinga* left side by side both in the text and index of the English edition. If they are one and the same species, the remarks on the differences between the young and old males are needlessly repeated. If they are distinct species, not the smallest character is assigned by which they can be distinguished. No museum zoologist could have made a worse muddle. Nothing is said about the first gnathopods of either sex. If these were left unexamined, the species might belong to *Orchestoidea* or *Talorchestia* just as well as to *Orchestia*.

A general resemblance in the second gnathopods of the Costa Rican species to those figured by Fritz Müller excited a hope that his description might be supplemented from the specimens now in hand. The hope was dissipated by more exact comparison. Though the young males showed the uniformly convex palm and smoothly concave finger-margin of the second gnathopods, combining with these the common youthful characters of slender second antennæ and slender hind peræopods, the older males and the females did not fall into line with the species represented by Müller. The length, compared with the breadth of the large hands, is much greater in the present species than in his, and the palm is less convex. Also in the delicate second gnathopod of the female there are several differences, most easily seen by a comparison of the figures. In the species here described the second joint, instead of being oval, has a straight hind margin and sinuous front one, the fifth and sixth joints are narrower than in Müller's species, and the rounded apex of the sixth is much more produced beyond the minute chela-forming finger. It may be added that, though the peduncles of the second antennæ are greatly thickened in the large males, the initial joints of the flagella show no additional fusion, nor is the thickening of the middle joints in the hind peræopods especially conspicuous.

The first pereopods are rather longer than the second. The latter have, as usual, the small finger notched on the inner margin near the apex. The fourth and fifth pereopods are much longer than the third. The second joint in the fifth pair is much broader than that in the fourth, being about as broad as it is long.

The hind corners of the second and third pleon segments are quadrate. The first uropods have equal rami, nearly as long as the peduncle. The second pair are shorter, with the rami equal and as long as the peduncle, the inner ramus so placed as not to reach quite so far back as the outer. The slender ramus of the third pair carries a row of four little spines. It is shorter than the stout peduncle. The sixth pleon segment is dorsally incomplete, having the gap in its armour cloaked by the telson. The telson has a dividing line down the center, the apex being bilobed, carrying two or three spinules on each lobe, and a pair of sublateral spines is placed higher up.

The male specimen, of which the parts are figured in the accompanying plate, measured from front of head to end of uropods seven-tenths of an inch, while a male with notch in palm of second gnathopods still undeveloped was only four-tenths of an inch long, or 5 mm. as contrasted with about 9 mm. in the larger example.

The specimens were forwarded to me as having been taken in January, 1902, by Mr. P. Biolley, at Isla del Coco, off Costa Rica.

The specific name is chosen to direct attention to the points of comparison between this form and that which for the present should be known as *Orchestia tucurana* Fritz Müller.

HYALELLA FAXONI, new species.

Plate LXI.

The back is well rounded, devoid of teeth. The first three segments of the pleon have the postero-lateral angles acute, those of the first pair being scarcely, but those of the third conspicuously, produced.

The eyes are round, very small, and wide apart.

The first antennæ have the peduncle well developed, but with the third joint a little shorter than the second, and the second than the first. The flagellum is elongate, its joints attaining to fourteen in number in the male. A specimen in which the flagellum was eleven-jointed had the eleventh joint about level with the eighth joint of the flagellum of the lower antennæ.

The second antennæ have both peduncle and flagellum longer than those of the preceding pair, the terminal joint of the peduncle considerably longer than the penultimate in the male, but very little longer in the female, an unbroken flagellum in the male having as many as seventeen joints. In a female specimen a flagellum of thirteen joints answers to one of ten in the first pair.

The first maxillæ have three setæ on the apex of the inner plate, instead of the two which appear to be the usual number in this genus.

The first gnathopods have a spiniferous boss, more developed in the male than in the female, on the hind margin of the fourth and fifth joints, and the palm of the subparallel-sided hand nearly transverse, not overlapped by the small finger.

In the male the large second gnathopods are very similar to those of *Hyalella dentata* Smith, and *Hyalella longistylus* (Faxon), but the hand is rather longer in proportion to the breadth. The palm ends in a slight bulging beyond the pocket into which the apex of the strongly curved finger closes. Near the hinge of hand and finger the palm has a somewhat tooth-like indent, just like the "notch" of *H. dentata* as figured and described by Prof. S. I. Smith, the slope of the palm being nearly straight and beset on each side with spines. In the female the hand is as long as the wrist, considerably wider distally than in the proximal half, the small, closely shutting finger not reaching the end of the palm. So far as can be judged from Professor Smith's complete lateral view of the female of his *H. incrimis*, both gnathopods in the female of that species are in close agreement with those of the present species.

The third peræopods are much shorter than the fourth or fifth pairs. In all three the second joint may be described as large and broadly oval, but in the fifth pair it is considerably broader and more rounded than in the other two pairs, with a length not much greater than the breadth. No "accessory branchiæ" were observed in connection with any of the limbs.

The third uropods are quite small, with the ramus tapering, nearly as long as the peduncle, but much narrower.

The telson is almost square, the distal margin carrying a pair of setules, its corners rounded.

A male specimen measured from front of head to the extremity of the slightly bent pleon three-tenths of an inch (7.5 mm.).

The specimens, 20 in number, were labeled as coming from a height of 2,400 meters, or 8,000 feet, on Volcan Reventado, and collected by Mr. P. Biolley.

The specific name is given in compliment to Dr. Walter Faxon, who in 1876 described several species of this genus and directed attention to some of the difficulties attending the delimitation of species within it. Dr. Faxon at that date<sup>a</sup> writes: "After an examination of a large number of *Hyalella dentata* and *H. incrimis* from Utah, I am satisfied that they are but varieties of one species. The form with dorsal teeth on the first and second abdominal segments is very probably synonymous with *Amphitoe aztecus* Saussure<sup>b</sup> and

<sup>a</sup> Bull. Mus. Harvard, III, p. 574.

<sup>b</sup> Mémoire sur divers Crustacés nouveaux du Mexique et des Antilles, 1858, p. 58, pl. v, fig. 33.



*Allochæstus knickerbockeri* Bate,<sup>a</sup> as pointed out by Professor Smith himself." It may be convenient to accept Saussure's name for the dentate form, although his description is vague and his figures rough. In the large second gnathopod, of which he gives a detailed figure, the wrist or fifth joint is entirely devoid of the characteristic projecting process. In my opinion the same motive of convenience is sufficiently strong to justify the retention of the specific name *inermis* for the form that is not dentate. This I have applied to specimens obtained by Mr. Edward Whymper at great heights in Ecuador.<sup>b</sup> None of these had dentate body segments. On first examining the specimens from Costa Rica, I was disposed to identify them with the species submitted to me by Mr. Whymper. About the close general resemblance there can be no question, but in detail I find the following differences: The new species here described has the antennæ of both pairs more elongate, the first joint in the third, fourth, and fifth pereopods larger and more broadly oval, and the postero-lateral angles of the third pleon segment much more decidedly produced. None of these characters, it must be confessed, are easy to appreciate except by comparison of actual specimens or of accurate figures drawn to the same scale. But the mouth organs show a curious feature, in that the first maxillæ, as above stated, have three setæ on the apex of the inner plate, alike in male and female, while *H. inermis* has only two. In the male of *H. faxoni* the first gnathopods have the hand not, or very little, broader at the palm than in the middle, whereas the *H. inermis* from Ecuador has a strong bulging of the palm beyond the point which the finger reaches, making the hand as broad as it is long. Also in the large second gnathopods there is a stronger bulge at the corresponding point, making the breadth of the hand in the Ecuador species greater in proportion to its length, and the "notch" at the other end of the palm is rounded off.

#### EXPLANATION OF PLATES.

##### PLATE LX.

##### *Talorchestia fritzi*, new species.

- n. s.* Length of male specimen examined, not including the antennæ.  
*a. s.*, *a. i.* The upper and lower antennæ, respectively, of the two sexes, with further enlargement of two joints of the flagellum in lower antennæ of male.  
*gn. 1*, *gn. 2.* First and second gnathopods, respectively, of the two sexes, with further enlargement of some of the distal joints.  
*prp. 2.* ♀. Second pereopod of the female, with enlargement of finger.  
*prp. 5.* Fifth pereopod of the male.

<sup>a</sup> Catalogue of the specimens of Amphipodous Crustacea in the Collection of the British Museum, 1862, p. 36, pl. vi, fig. 1.

<sup>b</sup> Travels among the Great Andes of the Equator, Appendix, 1891, p. 125.

*ur.* 1. Lateral view of first uropods of male, together with the second and third uropods and telson, in attachment to the fourth, fifth, and sixth segments of the pleon.

*ur.* 3. ♀. Third uropod of female.

*T.* Telson of female.

PLATE LXI.

*Hyalella faxoni*, new species.

*n. s.* Length of male specimen examined, not including the antennae.

*a. s., a. i.* Upper and lower antennae of the two sexes.

*mx.* 1. First maxilla (from a separate specimen).

*gn.* 1, *gn.* 2. First and second gnathopods of both sexes, with further enlargement of distal portion.

*prp.* 5. Fifth pereopod of male.

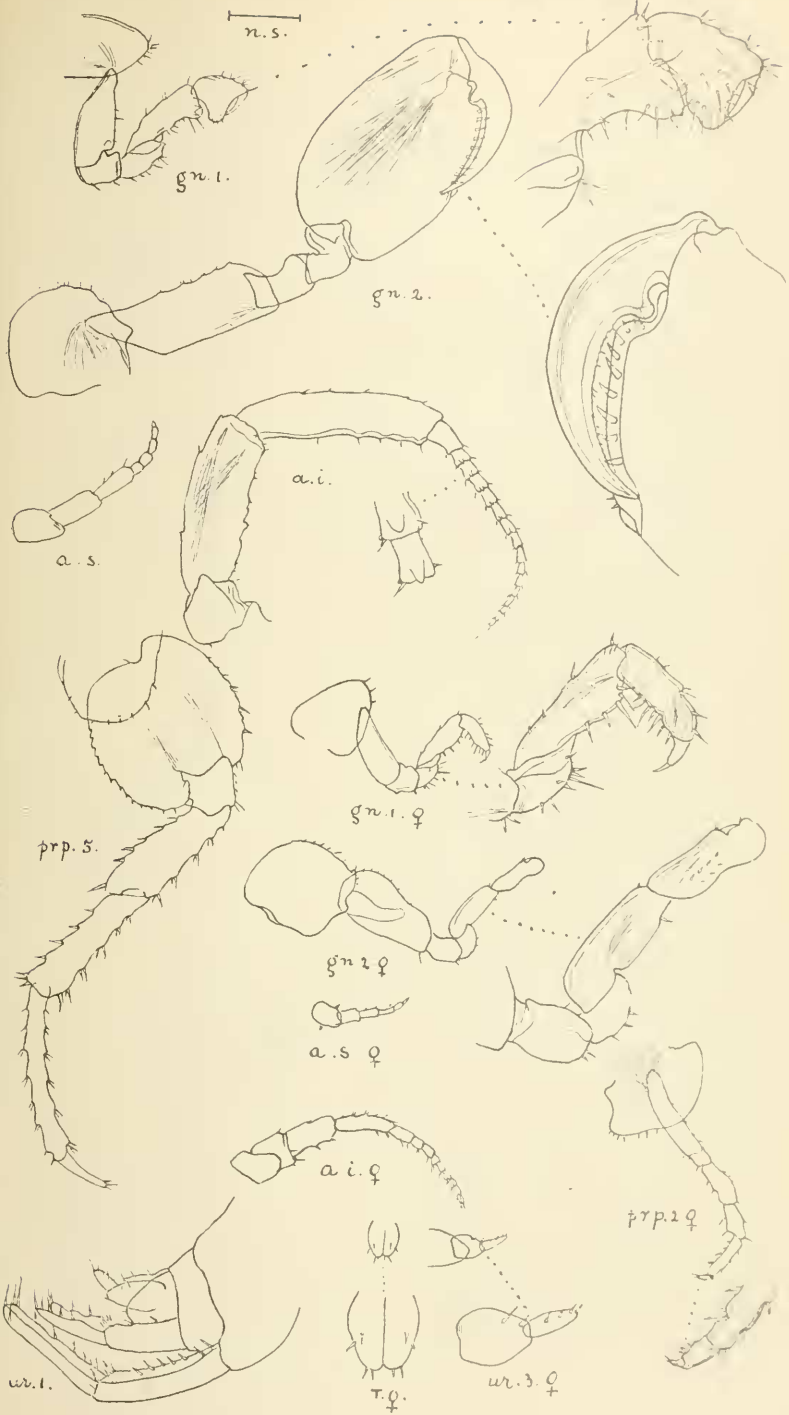
*Pl. s.* 3. ♀. Third pleon segment of female.

*ur.* 3. Third uropod, respectively, of male and female.

*T.* Telson of each sex, that of the male from the specimen of which the first maxilla is figured.

The figures are from male specimens, unless accompanied by the symbol of the female (♀).

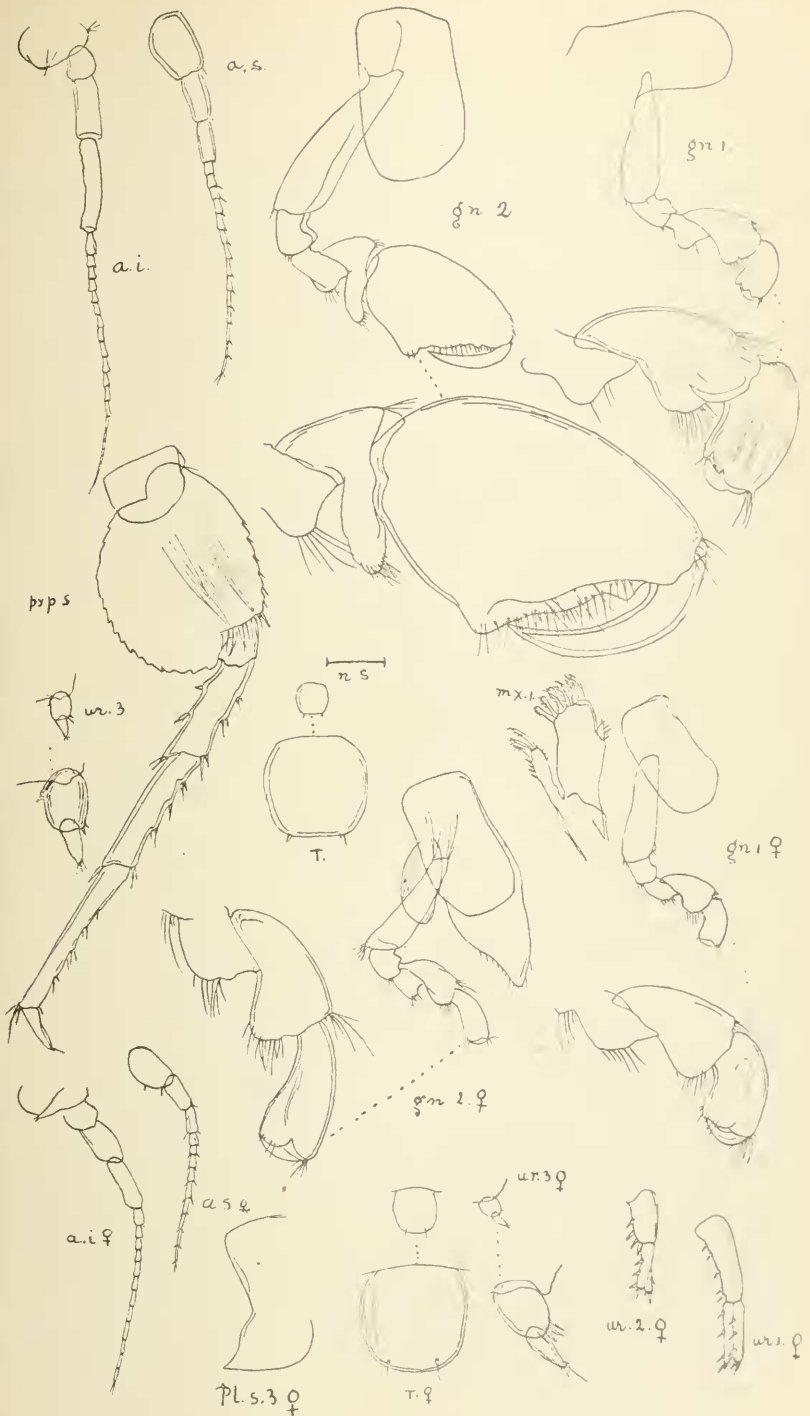
Only two scales of magnification are employed, all the figures except one being drawn to the lower scale, while some are wholly or partially duplicated on the higher scale. The first maxilla of *Hyalella faxoni* is represented only on the higher magnification.



TALORCHESTIA FRITZI, NEW SPECIES.

FOR EXPLANATION OF PLATE SEE PAGE 930.





HYALELLA FAXONI, NEW SPECIES.

FOR EXPLANATION OF PLATE SEE PAGE 931.